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# 4NS

## SUBMERSIBLE SEWAGE PUMPS

### GENERAL

- Furnish and install \_\_\_\_\_ Goulds Water Technology, Series 4NS, dual seal submersible sewage pump(s) rated for \_\_\_\_\_ GPM, at \_\_\_\_\_ ft. \_\_\_\_\_ Total Dynamic Head.
- Pump(s) shall be Goulds Water Technology, Order No.: \_\_\_\_\_.

### QUALIFICATIONS

All pump manufacturers must be pre-qualified by the engineer in order to qualify as acceptable manufacturers. Pre-qualification shall be no later than two (2) weeks prior to published bid date for this project. Failure to pre-qualify will be grounds for disqualification after the bid opening date. All decisions of qualification shall reside with the engineer of record at time of bidding.

### PUMP DESIGN

Pump(s) shall have (4) inch standard size ANSI discharge flange and shall be capable of handling sewage containing non-abrasive 3 inch maximum solids.

### IMPELLER

The impeller shall be fully enclosed, non-clog, non-overloading on the published curve with ejector (pump out) vanes on the top of the impeller for protection of the lower mechanical seal and hydraulic balance. The impeller shall be both statically and dynamically balanced in both planes located at the shrouds. The impeller shall be slip fitted to the shaft and key driven. The impeller shall be held in place with a bolt and washer system that shall secure the impeller against all axial loads imposed by the hydraulic conditions of operation.

### CASING

The casing shall be cast from ASTM A48 class 30 gray cast iron of sufficient thickness to withstand 1.5 times the shut off pressure generated by the largest impeller available for this model in accordance with current revision of the Hydraulic Institute Standards. The discharge connection shall be a standard 125 # ANSI 4 inch flange. The discharge flange shall be capable of bolting to 4 inch wet pit guide rail or to a 4x6 guide rail connection. The guide rail system shall support the full weight of the submersible pump without the need for any supports under the pump which would cause solids to build up and starve the pump. Designs which allow for mounting feet in the area of the suction of the pump shall not be allowed, unless the pump is installed using flexible discharge hose such that the rigid guide rail base cannot be used.

### SUBMERSIBLE MOTOR SPECIFICATION

Pump shall be driven by a completely sealed, electric submersible squirrel cage induction motor with a maximum nameplate rating of \_\_\_hp, \_\_\_rpm, \_\_\_volts, \_\_\_-phase, \_\_\_Hz.

All 7½ to 40 HP, 210 and 250 Frame motors shall have a Service Factor of 1.15. All motors shall be an air-filled design having all electrical parts enclosed in an air-filled cast iron, watertight enclosure sealed by means of O-rings and rabbeted joints with extra large overlaps.

The stator windings and leads shall be insulated with moisture-resistant Class F insulation for continuous duty in 40° C ambient. The motor shall be designed for continuous duty capable of a maximum of ten (10) starts per hour. Quantity two (2) automatic reset, normally-closed thermal overloads shall be imbedded in the motor windings to provide overheating protection. Motor winding thermostats must be connected to an electric controller per local and state codes and the National Electric Code. The two normally closed, on-winding thermostats (thermal overloads) shall open at 320° F (160° C) and close at 221° F (105° C).

The shaft shall rotate on a grease lubricated thrust bearing and a grease lubricated radial bearing with a minimum L10 life of 30,000 hours.

Lower shaft bearing shall be locked in place to prevent shaft movement and to take thrust loads.

All castings are to be ASTM A48 Class 30 Gray Cast Iron.

Motor shaft shall be one piece, 416 stainless steel. Carbon steel shafts or shaft sleeves are not acceptable.

### CAP/CABLE ASSEMBLY

Cable leads shall enter at the top of the motor and shall allow the cable-to-motor connection to be accomplished in the field without soldering.

The power cable and cap assembly shall be designed to prevent moisture from wicking through the cable assembly even when the cable jacket has been punctured.

Power and control cable entry into the lead connection chamber shall be epoxy encapsulated for positive moisture sealing. Compression type fittings or connectors shall be considered not equal. The use of Terminal boards for sealing purposes are not acceptable.

A Buna-N power and control cable grommet shall be provided in addition to the epoxy sealed leads.

Cable sealing system shall be capable of withstanding an external pressure test of 200 PSI as well as a cable assembly pull test as required by Underwriters Laboratories. Singular grommet or other similar sealing systems are not acceptable. Motor shall be supplied with 25 feet of multi-conductor power cable and control cable. Optional 50' cable lengths are available. Cable sizing shall conform to NEC Specifications and be UL listed and CSA certified. Acceptable cables and materials such as Neoprene, Hypolon and Viton shall be UL listed and CSA certified and listed on the jacket of the cable.

#### **SHAFT SEAL**

Two independently-mounted mechanical face type seals shall be provided. The inner and outer seal shall be separated by an oil filled chamber. Double seal (back to back) configurations are not acceptable due to the potential for failure of both seals as a result of lodged solids. Similarly bellows-type and jacketed seal construction is also prohibited.

The oil chamber shall act as a barrier to trap moisture and provide sufficient time for a planned shutdown. The oil shall also provide lubrication to the internal seal.

Standard John Crane Type 21 or equal, UL listed seals shall be provided. Carbon rotating faces and ceramic stationary faces shall be considered standard. Optional seal construction including Tungsten Carbide, Silicon Carbide faces and use of Viton elastomers are acceptable alternatives.

The outer seal construction shall be designed for easy replacement.

The outer seal assembly will be designed to allow solids and particles to be thrown away from the seal face.

#### **MOISTURE PROTECTION SYSTEM**

Dual (2) moisture sensing probes are to be provided that extend into the oil chamber located between the outer and inner seal and used to detect the presence of moisture should the outer seal fail.

The moisture protection system shall also be designed to detect water in the motor chamber and provide a warning signal prior to water levels reaching the bearing or wound stator assemblies. The use of a single moisture probe or float switch system shall be considered not acceptable.

#### **WET PIT INSTALLATION SYSTEM (Optional)**

Each pump shall be provided with a dual pipe type guide rail system consisting of a cast iron pump coupling and discharge base. The coupling shall be bolted to the standard ANSI discharge flange of the pump and shall then guide the pump down the twin pipe guide rails to the discharge base located at the bottom of the wet pit. There shall be no weight or other forces on the guide rail system which could cause binding of the coupling to the guide rail system. The system shall be designed to allow installation and removal of the pump without the need for any personnel to enter the pit. The guide rails shall be 2" Standard schedule 40 galvanized or stainless steel pipe which shall be provided by the installation contractor.

#### **MAJOR CASTING MATERIALS**

The impeller, casing, bearing/seal housing and motor shall be ASTM A48 Class 30 high quality cast iron for strength and long life. Bronze impeller shall be cast from ASTM B584 UNS C87600 when ordered as an option.

#### **CORROSION PROTECTION**

Both inner and outer surfaces of the pump shall be electrocoat-painted with thermo-setting Acrylic Enamel baked 20 minutes at 350° F, after castings are completely machined. Motor castings are primed with alkyd primer and finished with an epoxy ester finish coat of high grade paint to resist rust and corrosion.

#### **PUMP OPTIONS**

1. Bronze impeller.
2. Lower mechanical seal faces of tungsten carbide against silicon carbide or silicon carbide and silicon carbide.
3. Power cable and seal sensor cable of 50' length.
4. Epoxy point.
5. Refer to the factory for items not listed.

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